Pollution Prevention
Guidelines for

New Mexico
DENTAL FACILITIES

NMSU • UNM • DINÉ • NMIMT • SANDIA • LOS ALAMOS
WERC
A CONSORTIUM FOR ENVIRONMENTAL EDUCATION AND TECHNOLOGY DEVELOPMENT

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For more information, contact:

Chris Campbell, Project Manager
WERC Pollution Prevention Technical Resources Center
1155 University Blvd., SE
Albuquerque, NM 87106-4320

505.843.4251, fax 505.246.2891, 800.523.5996
chrisc@werc.net
www.werc.net

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What is Hazardous Waste?

As a result of doing business, a company may generate wastes that can cause serious problems if not handled and disposed of carefully. Such wastes could cause injury or death; damage or pollute land, air or water.

Hazardous waste is material that:

- can no longer be used for its intended purpose, including old raw materials (expired or off-specification).
- will be thrown away.
- will be transported away to be recycled, incinerated, smeltered or disposed of.

There are two ways a waste is identified as a hazardous waste in the regulatory system: regulatory publishing or "listing" and identification through characteristics.

Hazardous Waste Categories

1. **Listed Wastes:** Waste is considered hazardous if it appears on any one of the four lists contained in U.S. Environmental Protection Agency's (EPA) Resource Conservation and Recovery Act (RCRA) regulations. These wastes have been listed because they either exhibit one of the characteristics described below or contain any number of toxic constituents that have been shown to be harmful to health and the environment. More than 400 chemicals can be found on these lists.

   Broad "Listing" Categories Are
   - **F Wastes**-Waste derived from sources such as solvents.
   - **K Wastes**-Waste from manufacturing processes.
   - **P (Acute) and U Wastes**-Expired, old, or off-specification products and residues.

2. **Characteristic Wastes:** Even if a waste does not appear on an EPA list, it is considered hazardous if it has one or more of these characteristics:

   Ignitable (DOO1)
   Liquids, Solids or Gases, Flashpoint <140"F Easily combustible or flammable.

   Corrosive (D002) or Acid Liquids pH<2 or >12.5 Causes damage to skin and dissolves metals and other materials. A liquid with a pH of 2.0 or less, or 12.5 or greater. Examples are waste acids, and alkaline cleaners.

   Reactive Wastes(D003) Unstable or undergoes rapid and violent chemical reaction with other materials.

   Toxic Substances (D004 Thru DO43)(metals and pesticides) Materials that are considered as toxic to humans. A waste is TC (Toxic) hazardous if the TCLP (Toxicity Characteristic Leaching Procedure) exceeds the regulatory levels for any of the established 8 metals and 6 pesticides, and 25 organic compounds.

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The *Dental Waste Guidelines* comply with New Mexico state regulations. For information specific to the city of Albuquerque, contact Brynda Lujan with the city's Pollution Prevention program at 505-873-7058. For state-wide information, contact Chris Campbell, manager of WERC's Technical Resources Center, at 505-843-4251.

Hazardous Pollutants Found in Dental Offices

Following is a list of pollutants typically found in dental facilities along with the federal Resource Conservation and Recovery Act (RCRA) limits for those substances. The list is not complete. The pollutants listed here are ordinarily present in higher concentrations than other pollutants found in dental facilities, such as zinc, copper, selenium, molybdenum arsenic and cadmium. Dental facilities should check with their local publicly owned treatment works for local sewer use ordinance limits. Special precautions should be taken for dental facilities disposing of waste in septic tanks.

Hazardous Pollutants in Dental Office	City of Albuquerque Sewer Use Limit	RCRA Limit	Sources
Silver	5.0 mg/l	5.0 mg/l	X-Ray Fixer and Amalgam
Lead	1.0 mg/l	5.0 mg/l	Interoral Dental Packets
Mercury	.004 mg/l	0.2 mg/l	Amalgam
Formaldehyde*	100 mg/l	N/A**	
Chromium	4.1 mg/l	5.0 mg/l	Developer Cleaners
PH maximum limit	11.5	12.0	Various Cleaners or other Liquids
PH minimum limit	5.0	2.0	Various Cleaners or other Liquids

*Gluteraldehyde is a derivative of Formaldehyde. Formaldehyde is not a listed RCRA waste, however, OSHA regulates it, and municipalities in New Mexico may not allow discharge of formaldehyde or derivatives such as gluteraldhyde to be discharged.

Radiographic Developer and Fixer

Spent fixer is considered a hazardous waste when the silver concentration is 5 ppm or greater. X-ray fixer should not be discharged into septic tanks or into the sanitary sewer without first recovering silver from the waste stream.

Spent X-ray fixer can be recycled by a local recycler or by the supplier of X-ray materials. When 5 gallons of fixer has accumulated, contact a recycler or supplier to arrange for pick up or drop off. Dental facilities located in proximity to one another can arrange with the recycler to pick up spent fixer on a regular schedule.

Spent fixer should be collected and stored in a closed container labeled "Spent Fixer - Hazardous."

Silver Recovery Equipment

Silver recovery equipment can be purchased or leased. The two most widely used types of treatment systems are metallic replacement cartridges (MRCs) and electrolytic recovery units.

MRCs use elemental iron in steel wool or iron particles to replace silver in fixer solution. The silver precipitates from the fixer solution as sludge, which can be recycled.

Electrolytic units use an electrical current to plate out metallic silver that can also be recycled. Typically, electrolytic units do not reduce silver concentrations to levels that allow for disposal to the sewer system. Electrolytic units require the addition of an MRC to reduce the silver concentration to 5 ppm or less.

Some offices build their own silver recovery systems. Homemade systems require careful and stringent monitoring to ensure that they remove silver to meet local sewer use ordinances and New Mexico Hazardous Waste Regulations.

Test kits are available that indicate when MRCs are exhausted and need to be changed or rotated. These kits are available from most radiographic suppliers.

Kodak Customer Imaging Environmental Support Services advises that the best way to clean up spent X-ray fixer is to use an absorbent, or an absorbent sock. The absorbent or sock must then be treated as a hazardous waste.

There are fixer test solutions available to ensure full use of fixer. These solutions can be dropped into the fixer to indicate when the fixer is saturated with silver.

Fixer and developer should never be mixed as mixing inhibits silver reclamation. Some radiographic film processors automatically mix spent fixer and developer together. Usually, the fixer line can be adjusted to prevent mixing which will allow for recovery that is more efficient.

Most offices have processors that automatically mix the developer and fixer. However, some offices do not have automatic processors, these offices should consider the following guidelines. If developer is **not** mixed with fixer and has a pH between 5.0 and 11.5, it can be poured down the drain. Check the Material Safety Data Sheet (MSDS) for the pH of the developer that your office uses. Contact the p2 Program for a free check of the pH of your spent developer.

If developer is not mixed with fixer and has a pH between 5.0 and 11.5, it can be poured down the drain. The Material Safety Data Sheet (MSDS) accompanying the developer lists the pH level. If the pH of developer is higher than 11.5 it can be adjusted with a weak acid, such as vinegar, to lower the pH to meet the ordinance limit of 5.0 and 11.5. If the pH of spent developer is acidic (lower than 5.0), it can be adjusted using baking soda (sodium bicarbonate). Adjustment of pH should be done slowly and carefully to avoid a reaction.

New Mexico State Hazardous Waste Regulations may require a hazardous waste characterization or Toxicity Characteristic Leaching Procedure (TCLP) test, which is laboratory analysis of the concentration of metals or other pollutants. Contact the New Mexico Hazardous Waste Bureau for more information (505-428-2500) regarding the regulations.

Record Keeping and Testing

The state requires that specific information (i.e., rising silver concentrations, chemical spills, cleaning repairs, etc.), be recorded. Such recordkeeping can help to identify potential areas that can affect proper silver recovery system operation.

It is recommended that facilities that have a silver recovery system monitor the equipment on a monthly or bimonthly basis. Noting the date when MRCs were last changed and keeping records will help dental facilities meet state regulations.

Silver Recovery Record Sheet

City Rep. Initials	Result of Analysis by City	Date of Analysis by City	Date	Code	Comments	Dental Office Initials
			3/12/99	M	Changed cartridges	DH
			4/23/99	S	Spilled fixer on floor while changing cartridge	JG
				P	Diagnostic Imaging picked up 5 gallons of photo fixer	JK
BLL	5.0 mg/l	6/12/99	5/10/99	T	5 parts per million of silver	DH

Code Key

M=System Maintenance
T=Silver Test
P=Pickup of Spent Fixer by Recycler
S = Spill
W=Waste Disposal

The log at the end of these guidelines can be used to record information relating to silver recovery and recycling.

Recyclers should provide dental facilities with a manifest when collecting materials for recycling. Generators of hazardous waste are responsible from "cradle to grave." It is important to maintain proper documentation. Recycling usually carries the least liability.

Gluteraldehyde Solutions

Some hospitals, clinics and dental offices use gluterldehyde solutions to disinfect surgical instruments. When solutions lose their ability to disinfect, they are usually discarded.

Cities regulate the concentration of used gluteraldehyde solutions that may be discharged to the city sanitary sewer system. Holding these solutions for 14 to 21 days ensures that gluteraldehyde loses its toxicity. After holding it for the specified period, the solution can then be discharged to the sewer system as long as other contaminants are not present. Dental facilities may want to reevaluate the use of gluteradehyde. There are alternatives that pose fewer heath concerns.

- Scrape wastes, especially amalgam residues, from instruments before sterilization.
- Use autoclave to sterilize whenever possible.

Developer Cleaners

Some X-ray developer cleaners contain chromium, a hazardous pollutant. There are environmentally safe cleaners for X-ray developer systems. Radiographic suppliers can provide developer system cleaners that do not contain chromium. Cleaners with chromium at or above 5 parts per million (mg/l) should be disposed of as a hazardous waste and should not be discharged to the sewer. Chromium concentrations in developer system cleaners exceed New Mexico Hazardous Waste Regulations.

A good option is to have a cleaning service maintain the X-ray unit and properly dispose of cleaning wastes.

Radiographic Film

-ray film can be recycled. Companies reclaim the silver and use the plastic from used film for other products.

Amalgam

malgam may be a hazardous waste because of silver and mercury concentrations. Waste mercury is a listed toxic hazardous waste; the RCRA limit for mercury is 0.2 parts per million (mg/l). Silver is a listed toxic waste; the RCRA limit for silver is 5 parts per million (mg/l).

Elemental mercury should never be poured down the sanitary sewer or put in the garbage. Mercury can be recycled or disposed of as a hazardous waste. Avoid rinsing amalgam down the sink, disposing it in the trash or discarding it as infectious waste.

Store waste amalgam in a designated airtight container. Label the container "Mercury Amalgam: Recyclable Scrap Metal." Include the name, address and telephone number of the facility and the date that accumulation started.

Store scrap amalgam, including amalgam from traps, in a container filled with depleted fixer to minimize the release of mercury vapor. Keep in mind, the spent fixer used to store waste amalgam should not be poured into metallic replacement cartridges or into the container in which spent fixer is collected for recycling. The fixer may be contaminated with mercury. Once spent fixer has contact with waste amalgam it should only be used for storage of waste amalgam, or disposed of as hazardous waste.

Consider cleaning and/or replacing sink traps and filters. Mercury often settles at low points such as sinks, traps and sumps. The slow dissolution of mercury can result in mercury releases for years after disposal practices have been corrected. The sludge from the sumps and traps should be handled as if contaminated.

Disposable traps and in-line filters can be disposed of as municipal solid waste if they are disinfected and visible pieces of waste are removed.

Fine amalgam particles from tooth preparation or amalgam removal may pass through amalgam traps, filters, and be released to the sewer. An amalgam separator connects to vacuum pump before sewer discharge. There are companies that sell or lease amalgam separators. They will install, maintain and recycle the captured amalgam.

that sell or lease amalgam separators. They will install, maintain and recycle the captured amalgam The use of precapsulated amalgam will eliminate the possibility of a bulk mercury spill. Empty amalgam capsules can be discarded with municipal solid waste.

Facilities with excess mercury may want to contact other facilities that may need bulk mercury and arrange an exchange.

Cleaning and Managing Mercury Spills

Mercury collected from spills should be treated as a hazardous waste.

Dental offices should have a written Spill Control Plan for mercury, amalgam and other chemicals. Such a plan can be part of the required Occupational Safety and Health Administration Spill Plan. Avoid storing amalgam near carpeting or rough areas, which are difficult to clean. Bulk mercury should be stored in unbreakable containers on stable surfaces.

Spilled mercury may be picked up with trap bottles or tapes, or spill kits. Consult with dental suppliers for available commercial mercury spill kits.

Lead

Lead in concentrations of 5 parts per million (mg/l) or higher is classified as hazardous by the Resource Conservation and Recovery Act standards and New Mexico hazardous waste regulations.

Intraoral packets contain lead foil and may be hazardous. Lead foil may be removed from used intraoral film packets and recycled by film suppliers or a metals recycler.

If lead foil is not recycled, the New Mexico hazardous waste regulations require that a Toxicity Characteristic Leaching Procedure (TCLP) be preformed. If the TCLP indicates the intraoral packets contain lead at 5 parts per million or more the material must be handled as a hazardous waste. Disposal of lead foil to the landfill is not recommended because lead may leach out. Lead aprons and shields should be recycled or disposed of as hazardous waste.

Solvents

Flammable substances can cause explosions in the sewer system, injure utility workers and damage plumbing. Contact the local fire department at for storage requirements.

Never pour flammable materials, including straight alcohol, ether, acetone, xylol, chloroform or other solvents down the drain.

Chloroform is a listed waste (U044) and should always be handled as a hazardous waste.

Sources

The Environmentally Responsible Dental Office: A Guide to Proper Waste Management in Dental Offices, Northeast Natural Resource Center of the National Wildlife Federation and Vermont Dental Society, June 1999.

Best Management for Dental Wastes, City of Boulder, Public Works/Utilities/Industrial Pretreatment Program.

How to Prevent Pollution from Your Dental Practice: A Guide for Dentists, Indiana Department of Environmental Management, 1995.

X-Ray Fixer Log and Silver Recovery Record Sheet

City Rep. Initials	Result of Analysis by City	Date of Analysis by City	Date	Code	Comments	Dental Office nitials

Dental Waste Contacts

Company Name	Address	Phone #	Fax #
Academy Corporation	6905-A Washington NE Albuquerque, NM 87109	505-345-1805	505-344-4638
Bethlehem Apparatus	890 Front Street (PO Box Y) Hellertown, PA 18055	610-838-7034	610-838-6333
Century	21630 Hanover Ave. Lakeville, MN 55044	612-985-9995	612-985-9998
CRE	116 E. Prospect Ave. Burbank, CA 91502	818-843-2811	818-843-2862
D.F. Goldsmith	909 Pitner Ave. Evanston, IL 60202	847-869-7800	847-869-2531
Dental Recycling of North America www.drna.com	PO Box 1069 Hackensack, NMJ	800-360-1001	201-489-4740
DMS Refining	45 E. Knoxville Danridge, TN 37725	423-397-9447	423-397-3963
Doral Refining Co.	533 Atlantic Ave Free Port, NY 11520	800-645-2794	516-223-3936
Eastman Kodak Co.	343 State St. Rochester, NM 14650	800-933-8031	800-374-1871
Enviro-Chem Inc.	21821 Industrial Blvd. Rogers, NM 55374	763-428-4002	763-428-4513
Matrix Medical Inc.	145 Mid County Drive Orchard Park, NY 14127	1-800-847-1000	
McGuire & Strickland Refining Company	1290 81st. Ave. NE Minneapolis, NM 55432	612-786-2858 1-800-486-2858	
Mercury Refining Co.	1218 Central Ave. Albany, NY 12205	800-833-3505	518-459-2334
MXR-- Merry X-Ray Chemical Corp.	4603 McLeod NE Albuquerque, NM 87109	505-872-2139	505-872-2193
Patterson Dental Co.	3411 Candelaria NE Albuquerque, NM 87107	505-884-6747	505-884-0483
Premier Dental	325 Armour Ave. South St. Paul, NM 55107	651-453-0225	
R & D Services	8120 Greenlake Dr. N. Seattle, WA 98103	206-525-4994	206-525-2063
R & D Services	1224 2nd NW Albuquerque, NM 87102	505-247-4576	
Safety-Kleen	2720 Girard NE Albuquerque, NM 87110	505-884-2277	505-883-4890
Sandia Recycling	2701 2nd NW Albuquerque, NM 87111	505-345-8005	505-345-8005
Stericycle	1920 1st. St. NW Albuquerque, NM 87102	505-247-4430 1-800-879-4627	
Sullivan Dental Products	4421 McLeod Rd. NE, Ste. E Albuquerque, NM 87109	505-856-3411 1-800-645-6594	505-856-0764

Recyclers by Material

Company Name	Silver Refining And Collection Services (RC)	Silver Recovery Equipment Low Flows (50 to 150 gal./cartridge) (SRE)	Scrap Film Silver Recovery (SF)	Amalgam and Mercury Recyclers (AM)	Amalgam Capture Equipment (ACE)	Lead Foil Recyclers (LF)	Materials Exchange Network (MEN)
Academy Corporation	RC	SRE	SF				
Bethlehem Apparatus				AM			
Century			SF				
CRE, Inc.		SRE					
D.F. Goldsmith							
Dental Recycling of North America				AM	ACE	LF	
DMS Refining			SF				
Doral Refining Co.				AM			
Eastman Kodak Co.		SRE				LF	MEN
Enviro-Chem Inc.		SRE		AM			
Matrix Medical, Inc.					ACE		
McGuire & Strickland Refining Co.	RC	SRE	SF	AM		LF	
Mercury Refining Co.				AM			
MXR-- Merry X-Ray Chemical Corp.**							
Patterson Dental Co.		SRE					
Premier Dental				AM			
R & D Services					ACE		
Rudy's Downtown Recycling						LF	
Safety-Kleen	RC	SRE	SF	AM	ACE	LF	MEN
Sandia Recycling	RC		SF			LF	
Stericycle	RC		SF	AM		LF	
Sullivan Dental Products		SRE	SF				

**MXR picks up X-Ray fixer from dental offices and hospitals only.
The above lists are not complete lists of all companies available. The City of Albuquerque does not endorse any of the listed companies or the services they provide.
Provided by the City of Albuquerque's Public Works Department/Wastewater Utility Division/Pollution Prevention (p2) Program. For additional information on pollution prevention, or companies interested in being added to this list, please contact the p2 Program at 873-7058/7059. (last update 7-9-01)

Mercury Recyclers

Company Name	Address	Phone	Fax
Bethlehem Apparatus	890 Front St. (P.O. Box Y) Hellertown, PA 18055	610-838-7034	610-838-6333
Dental Recycling of N. America	P.O. Box 1069 Hackensack, NJ 07601	800-360-1001	201-489-4740
D.F. Goldsmith	909 Pitner Avenue Evanston, IL 60202	847-869-7800	847-869-2531
McGuire & Strickland Refining Co.	1290 81st. Ave. NE Minneapolis, MN 55432	763-786-2858 1-800-486-2858	
Medovations**	102 East Keefe Ave. Milwaukee, WI 53212	1-800-558-6408	414-265-7628
Stericycle	1920 1st. St. NW Albuquerque, NM 87102	505-247-4430 1-800-879-4627	

** Has an exchange program for Maloney and Hurst bougies.
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Glossary of Terms

Acute Toxicity
Adverse health effects resulting from brief exposure to a chemical (e.g. seconds, minutes, hours).

Corrosive
A chemical that causes visible destruction of or irreversible alteration in living tissue by chemical action at the site of contact, or which causes severe corrosion rate in steel or aluminum.

Hazardous Characteristic
Hazardous waste characterization requires a basic understanding of the information provided Material Safety Data Sheets (MSDS). The information on the MSDS sheet can indicate the potential for the resulting waste to be "characteristic hazardous waste" based on the physical properties of the materials.

Electrolytic
An electrical current is passed through a silver-rich solution that causes the silver to plate onto an anode for reclamation.

Formaldehyde
Used as a preservative or disinfectant.

Gluteraldehyde
A derivative of formaldehyde.

Ignitable
Liquids, solids, or gases with a flash point of 140 degrees or less.

Metallic Replacement Cartridge (MRC)
A plastic canister packed with steel wool. Silver from X-Ray fixer plates onto the steel wool and is recovered for reclamation.

pH
The measure of the acidity or alkalinity of a solution.

Pollutant
A waste material that contaminates, air, soil, or water.

Publicly Owned Treatment Works (POTW)
A wastewater treatment plant, device, or collection system owned by a local, state, or government agency used in the collection, storage, treatment, recycling, and reclamation of sewage or industrial wastes of liquid nature, and any conveyances which covey water to the plant.

Reactive
A material which is unstable and reacts readily with air or water. Included are materials that spontaneously ignite in air or water, react vigorously with air, and give off flammable gas on reaction with water.

Resource Conservation and Recover Act (RCRA)
RCRA's major emphasis is the control of hazardous waste disposal. RCRA controls all solid-waste disposal and encourages recycling and alternative energy source. The U.S. Environmental Protection Agency enforces RCRA regulations.